AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF MINNESOTA

Plant Pathology
Fact Sheet 36—1983
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Corn Eyespot

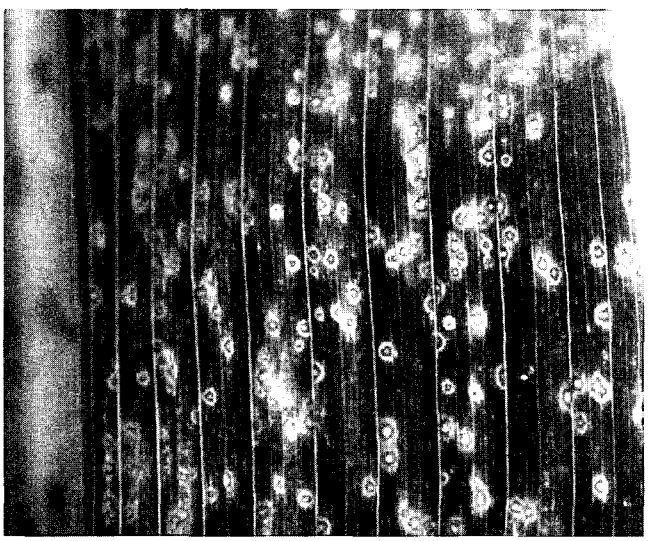
Foliar disease on field corn is generally a minor problem. Not since the epidemic of southern corn leaf blight has leaf disease seriously reduced corn yields. Eyespot (picture 1) has been recognized as a foliar disease of corn in Minnesota and other northern corn producing areas since 1968. The disease occurs throughout Minnesota, yet is more severe in the north central and south eastern regions. Historically, eyespot was considered only a late season disease. But it was often overlooked since it appeared so late in the season. Any leaf death due to eyespot was not credited to the disease but to maturity, frost, old age or unknown causes.

Eyespot leaf blight definitely can reduce yields. Since 1980 eyespot has been found in early June in continuous corn production fields. Eyespot symptoms when present on 25 percent of the foliage at silking time, have reduced yields by 10-12 bushels per acre. Inoculated trials had losses of 40 bushels per acre and the plants had a 10-fold increase in lodging at harvest time. Eyespot can cause premature death of foliage and may lower moisture content of corn fodder to an unsafe level for silage.

Picture 1: Symptom seen when holding leaf to sky.

Symptoms

Early symptoms consist of small, translucent, circular to oval lesions (1/8 to 1/4 inch diameter), with yellow "halos". The spots develop early and/or late in the season. At first the spot appears water-soaked. Later in symptom development, a tan to cream center is surrounded by a brown to purple ring with a narrow yellow halo called an "eyespot". Symptoms (picture 2) may develop on the leaf sheath and outer husk but are usually found in large numbers on the leaves of plants grown in infected corn debris. The yellow halo symptom is best viewed when holding the corn leaf to the sky or backlighting the sample. Kernel infections have been reported on severely infected plants.



Picture 2: Note yellow halo — eyespot symptom.

Causal Organism

The fungus Kabatiella zeae, the causal agent of the eyespot disease, was first reported from Japan as the cause of "brown spot". It has since been found in Canada, Argentina, Austria, France, Germany, Yugoslavia, New Zealand, and the USA. This fungus grows in the leaf tissue. It produces and releases conidia through the stomata of maize leaves. Fungal spore germination is optimum in culture at 24C/75F while growth is slow (0.8 - .12 inch/day).

Disease Cycle

The eyespot fungus causes lesions on leaf and sheath tissue. Infected corn tissue on the soil surface is an ideal site for overwintering survival and corn debris serves as a primary source of inoculum for next years corn crop. Spores or conidia are produced on infested corn debris and are spread by wind and splashing rain. A spore lands on new leaf tissue, germinates, penetrates, and forms a new lesion in 4-10 days.

Under cool to moderate temperatures and high humidity, new spores are produced and the disease cycle repeats. The number of cycles and disease severity are determined by the length of favorable weather conditions. A susceptible hybrid will have more damage (picture 3).

Picture 3: Fifty percent of leaf area infected.

Epidemiology

Corn is the only reported host for this fungus, Kabatiella zeae. Disease development occurs best under cool, humid weather. Certain inbred lines and hybrids are less susceptible to this disease. The presence of inoculum early in the season close to developing plants and cool (65-70°F), humid weather conditions combined with a susceptible hybrid can result in losses of 10-15 bushels per acre.

Since this disease organism readily survives on infested corn debris, an increase in the incidence and severity could be expected as tillage practices are reduced. The increased acreage under reduced tillage and on corn production has changed the occurrence pattern of this disease. Before 1970 eyespot was referred to as a late season disease but since then many reports describe the disease as being present in June on young plants.

Eyespot has been shown to be more severe and present earlier under no-till or chisel plow systems when compared to fall plowing. However, that relationship does not occur every year because favorable weather for disease development is also required. The threat of eyespot is greater under reduced tillage because this fungus survives on corn debris and only corn debris. More surface residue can mean more inoculum in the spring which may result in earlier infections and greater disease development on the plant when it can reduce yields. Loss of leaf tissue in late September or October will cause less yield reduction than the same tissue lost at silking time.

Control

The corn grower who is using a reduced tillage system should be aware of the greater potential for eyespot disease. The relationship between tillage and disease is clear. Proper selection of hybrids can reduce the severity of eyespot. While eyespot resistance may not be advertised, you can request information from dealers on eyespot disease reaction. Don't depend on demonstration plots where corn residue is deeply incorporated by conventional tillage. Also remember the disease symptom expression is dependent on favorable weather. A hybrid may look good one year and be severely damaged the next. Early maturity hybrids may tend to be more prone to eyespot.

Another control method is rotation. Apparently little corn residue after the rotation crop is suitable for Kabatiella zeae survival and inoculum production. Fields located side by side, one a continuous corn and the other a corn/soybean rotation, which use a ridge till system had significantly different levels of eyespot disease. The disease started very early in the continuous corn field but only late in the season was significant eyespot found in the corn/soybean field. Yield measurements show an average yield loss of 10 bushels per acre.

Another control method is deep plowing following a year when the disease was present to keep it from becoming a serious problem the next year. This has been a standard practice in the past and may be feasible in some cropping systems. Fungicide application was used to control eyespot and determine yield reduction due to eyespot. Manzate-200 or Dithane M-45 may be used but treatment is usually economical only for seed corn production and sweet corn.